



# SEQUENCE LISTING

<110> The Scripps Research Institute  
Schultz, Peter  
Wang, Lei  
Zhang, Zhiwen

<120> GLYCOPROTEIN SYNTHESIS

<130> 54A-000610US

<140> US 10/686,944

<141> 2003-10-15

<160> 10

<170> PatentIn version 3.1

<210> 1

<211> 306

<212> PRT

<213> Artificial

<220>

<223> mutant synthetase derived from Methanococcus jannaschii tyrosyl-t  
RNA synthetase

<400> 1

Met Asp Glu Phe Glu Met Ile Lys Arg Asn Thr Ser Glu Ile Ile Ser  
1 5 10 15

Glu Glu Glu Leu Arg Glu Val Leu Lys Lys Asp Glu Lys Ser Ala Leu  
20 25 30

Ile Gly Phe Glu Pro Ser Gly Lys Ile His Leu Gly His Tyr Leu Gln  
35 40 45

Ile Lys Lys Met Ile Asp Leu Gln Asn Ala Gly Phe Asp Ile Ile Ile  
50 55 60

Leu Leu Ala Asp Leu His Ala Tyr Leu Asn Gln Lys Gly Glu Leu Asp  
65 70 75 80

Glu Ile Arg Lys Ile Gly Asp Tyr Asn Lys Lys Val Phe Glu Ala Met  
85 90 95

Gly Leu Lys Ala Lys Tyr Val Tyr Gly Ser Glu Phe Gln Leu Asp Lys  
100 105 110

Asp Tyr Thr Leu Asn Val Tyr Arg Leu Ala Leu Lys Thr Thr Leu Lys  
115 120 125

Arg Ala Arg Arg Ser Met Glu Leu Ile Ala Arg Glu Asp Glu Asn Pro  
130 135 140

Lys Val Ala Glu Val Ile Tyr Pro Ile Met Gln Val Asn Gly Cys His  
145 150 155 160

Tyr Arg Gly Val Asp Val Ala Val Gly Gly Met Glu Gln Arg Lys Ile  
165 170 175

His Met Leu Ala Arg Glu Leu Leu Pro Lys Lys Val Val Cys Ile His  
180 185 190

Asn Pro Val Leu Thr Gly Leu Asp Gly Glu Gly Lys Met Ser Ser Ser  
195 200 205

Lys Gly Asn Phe Ile Ala Val Asp Asp Ser Pro Glu Glu Ile Arg Ala  
210 215 220

Lys Ile Lys Lys Ala Tyr Cys Pro Ala Gly Val Val Glu Gly Asn Pro  
225 230 235 240

Ile Met Glu Ile Ala Lys Tyr Phe Leu Glu Tyr Pro Leu Thr Ile Lys  
245 250 255

Arg Pro Glu Lys Phe Gly Gly Asp Leu Thr Val Asn Ser Tyr Glu Glu  
260 265 270

Leu Glu Ser Leu Phe Lys Asn Lys Glu Leu His Pro Met Asp Leu Lys  
275 280 285

Asn Ala Val Ala Glu Glu Leu Ile Lys Ile Leu Glu Pro Ile Arg Lys  
290 295 300

Arg Leu  
305

<210> 2  
<211> 306  
<212> PRT  
<213> Artificial

<220>  
<223> mutant synthetase derived from Methanococcus jannaschii tyrosyl-t  
RNA synthetase

<400> 2

Met Asp Glu Phe Glu Met Ile Lys Arg Asn Thr Ser Glu Ile Ile Ser  
 1 5 10 15  
 Glu Glu Glu Leu Arg Glu Val Leu Lys Lys Asp Glu Lys Ser Ala Leu  
 20 25 30  
 Ile Gly Phe Glu Pro Ser Gly Lys Ile His Leu Gly His Tyr Leu Gln  
 35 40 45  
 Ile Lys Lys Met Ile Asp Leu Gln Asn Ala Gly Phe Asp Ile Ile Ile  
 50 55 60  
 Leu Leu Ala Asp Leu His Ala Tyr Leu Asn Gln Lys Gly Glu Leu Asp  
 65 70 75 80  
 Glu Ile Arg Lys Ile Gly Asp Tyr Asn Lys Lys Val Phe Glu Ala Met  
 85 90 95  
 Gly Leu Lys Ala Lys Tyr Val Tyr Gly Ser Glu Phe Gln Leu Asp Lys  
 100 105 110  
 Asp Tyr Thr Leu Asn Val Tyr Arg Leu Ala Leu Lys Thr Thr Leu Lys  
 115 120 125  
 Arg Ala Arg Arg Ser Met Glu Leu Ile Ala Arg Glu Asp Glu Asn Pro  
 130 135 140  
 Lys Val Ala Glu Val Ile Tyr Pro Ile Met Gln Val Asn Gly Thr His  
 145 150 155 160  
 Tyr Arg Gly Val Asp Val Ala Val Gly Gly Met Glu Gln Arg Lys Ile  
 165 170 175  
 His Met Leu Ala Arg Glu Leu Leu Pro Lys Lys Val Val Cys Ile His  
 180 185 190  
 Asn Pro Val Leu Thr Gly Leu Asp Gly Glu Gly Lys Met Ser Ser Ser  
 195 200 205  
 Lys Gly Asn Phe Ile Ala Val Asp Asp Ser Pro Glu Glu Ile Arg Ala  
 210 215 220  
 Lys Ile Lys Lys Ala Tyr Cys Pro Ala Gly Val Val Glu Gly Asn Pro  
 225 230 235 240

Ile Met Glu Ile Ala Lys Tyr Phe Leu Glu Tyr Pro Leu Thr Ile Lys  
245 250 255

Arg Pro Glu Lys Phe Gly Gly Asp Leu Thr Val Asn Ser Tyr Glu Glu  
260 265 270

Leu Glu Ser Leu Phe Lys Asn Lys Glu Leu His Pro Met Asp Leu Lys  
275 280 285

Asn Ala Val Ala Glu Glu Leu Ile Lys Ile Leu Glu Pro Ile Arg Lys  
290 295 300

Arg Leu  
305

<210> 3

<211> 306

<212> PRT

<213> Artificial

<220>

<223> mutant synthetase derived from Methanococcus jannaschii tyrosyl-t  
RNA synthetase

<400> 3

Met Asp Glu Phe Glu Met Ile Lys Arg Asn Thr Ser Glu Ile Ile Ser  
1 5 10 15

Glu Glu Glu Leu Arg Glu Val Leu Lys Lys Asp Glu Lys Ser Ala Ala  
20 25 30

Ile Gly Phe Glu Pro Ser Gly Lys Ile His Leu Gly His Tyr Leu Gln  
35 40 45

Ile Lys Lys Met Ile Asp Leu Gln Asn Ala Gly Phe Asp Ile Ile Ile  
50 55 60

Leu Leu Ala Asp Leu His Ala Tyr Leu Asn Gln Lys Gly Glu Leu Asp  
65 70 75 80

Glu Ile Arg Lys Ile Gly Asp Tyr Asn Lys Lys Val Phe Glu Ala Met  
85 90 95

Gly Leu Lys Ala Lys Tyr Val Tyr Gly Ser Glu Phe Gln Leu Asp Lys  
100 105 110

Asp Tyr Thr Leu Asn Val Tyr Arg Leu Ala Leu Lys Thr Thr Leu Lys

115	120	125
Arg Ala Arg Arg Ser Met Glu Leu Ile Ala Arg Glu Asp Glu Asn Pro		
130	135	140
Lys Val Ala Glu Val Ile Tyr Pro Ile Met Gln Val Asn Gly Gly His		
145	150	155
		160
Tyr Leu Gly Val Asp Val Ile Val Gly Gly Met Glu Gln Arg Lys Ile		
	165	170
		175
His Met Leu Ala Arg Glu Leu Leu Pro Lys Lys Val Val Cys Ile His		
	180	185
		190
Asn Pro Val Leu Thr Gly Leu Asp Gly Glu Gly Lys Met Ser Ser Ser		
	195	200
		205
Lys Gly Asn Phe Ile Ala Val Asp Asp Ser Pro Glu Glu Ile Arg Ala		
210	215	220
Lys Ile Lys Lys Ala Tyr Cys Pro Ala Gly Val Val Glu Gly Asn Pro		
225	230	235
		240
Ile Met Glu Ile Ala Lys Tyr Phe Leu Glu Tyr Pro Leu Thr Ile Lys		
	245	250
		255
Arg Pro Glu Lys Phe Gly Gly Asp Leu Thr Val Asn Ser Tyr Glu Glu		
	260	265
		270
Leu Glu Ser Leu Phe Lys Asn Lys Glu Leu His Pro Met Asp Leu Lys		
	275	280
		285
Asn Ala Val Ala Glu Glu Leu Ile Lys Ile Leu Glu Pro Ile Arg Lys		
290	295	300
Arg Leu		
305		

<210> 4

<211> 306

<212> PRT

<213> Artificial

<220>

<223> mutant synthetase derived from Methanococcus jannaschii tyrosyl-t  
RNA synthetase

<400> 4

Met Asp Glu Phe Glu Met Ile Lys Arg Asn Thr Ser Glu Ile Ile Ser  
1 5 10 15

Glu Glu Glu Leu Arg Glu Val Leu Lys Lys Asp Glu Lys Ser Ala Tyr  
20 25 30

Ile Gly Phe Glu Pro Ser Gly Lys Ile His Leu Gly His Tyr Leu Gln  
35 40 45

Ile Lys Lys Met Ile Asp Leu Gln Asn Ala Gly Phe Asp Ile Ile Ile  
50 55 60

Leu Leu Ala Asp Leu His Ala Tyr Leu Asn Gln Lys Gly Glu Leu Asp  
65 70 75 80

Glu Ile Arg Lys Ile Gly Asp Tyr Asn Lys Lys Val Phe Glu Ala Met  
85 90 95

Gly Leu Lys Ala Lys Tyr Val Tyr Gly Ser Pro Phe Gln Leu Asp Lys  
100 105 110

Asp Tyr Thr Leu Asn Val Tyr Arg Leu Ala Leu Lys Thr Thr Leu Lys  
115 120 125

Arg Ala Arg Arg Ser Met Glu Leu Ile Ala Arg Glu Asp Glu Asn Pro  
130 135 140

Lys Val Ala Glu Val Ile Tyr Pro Ile Met Gln Val Asn Cys Tyr His  
145 150 155 160

Tyr Arg Gly Val Asp Val Ala Val Gly Gly Met Glu Gln Arg Lys Ile  
165 170 175

His Met Leu Ala Arg Glu Leu Leu Pro Lys Lys Val Val Cys Ile His  
180 185 190

Asn Pro Val Leu Thr Gly Leu Asp Gly Glu Gly Lys Met Ser Ser Ser  
195 200 205

Lys Gly Asn Phe Ile Ala Val Asp Asp Ser Pro Glu Glu Ile Arg Ala  
210 215 220

Lys Ile Lys Lys Ala Tyr Cys Pro Ala Gly Val Val Glu Gly Asn Pro  
225 230 235 240

Ile Met Glu Ile Ala Lys Tyr Phe Leu Glu Tyr Pro Leu Thr Ile Lys  
245 250 255

Arg Pro Glu Lys Phe Gly Gly Asp Leu Thr Val Asn Ser Tyr Glu Glu  
260 265 270

Leu Glu Ser Leu Phe Lys Asn Lys Glu Leu His Pro Met Asp Leu Lys  
275 280 285

Asn Ala Val Ala Glu Glu Leu Ile Lys Ile Leu Glu Pro Ile Arg Lys  
290 295 300

Arg Leu  
305

<210> 5  
<211> 306  
<212> PRT  
<213> Artificial

<220>  
<223> mutant synthetase derived from Methanococcus jannaschii tyrosyl-t  
RNA synthetase

<400> 5

Met Asp Glu Phe Glu Met Ile Lys Arg Asn Thr Ser Glu Ile Ile Ser  
1 5 10 15

Glu Glu Glu Leu Arg Glu Val Leu Lys Lys Asp Glu Lys Ser Ala Gly  
20 25 30

Ile Gly Phe Glu Pro Ser Gly Lys Ile His Leu Gly His Tyr Leu Gln  
35 40 45

Ile Lys Lys Met Ile Asp Leu Gln Asn Ala Gly Phe Asp Ile Ile Ile  
50 55 60

Leu Leu Ala Asp Leu His Ala Tyr Leu Asn Gln Lys Gly Glu Leu Asp  
65 70 75 80

Glu Ile Arg Lys Ile Gly Asp Tyr Asn Lys Lys Val Phe Glu Ala Met  
85 90 95

Gly Leu Lys Ala Lys Tyr Val Tyr Gly Ser Gly Phe Gln Leu Asp Lys  
100 105 110

Asp Tyr Thr Leu Asn Val Tyr Arg Leu Ala Leu Lys Thr Thr Leu Lys  
115 120 125

Arg Ala Arg Arg Ser Met Glu Leu Ile Ala Arg Glu Asp Glu Asn Pro  
130 135 140

Lys Val Ala Glu Val Ile Tyr Pro Ile Met Gln Val Asn Cys Met His  
145 150 155 160

Tyr His Gly Val Asp Val Ala Val Gly Gly Met Glu Gln Arg Lys Ile  
165 170 175

His Met Leu Ala Arg Glu Leu Leu Pro Lys Lys Val Val Cys Ile His  
180 185 190

Asn Pro Val Leu Thr Gly Leu Asp Gly Glu Gly Lys Met Ser Ser Ser  
195 200 205

Lys Gly Asn Phe Ile Ala Val Asp Asp Ser Pro Glu Glu Ile Arg Ala  
210 215 220

Lys Ile Lys Lys Ala Tyr Cys Pro Ala Gly Val Val Glu Gly Asn Pro  
225 230 235 240

Ile Met Glu Ile Ala Lys Tyr Phe Leu Glu Tyr Pro Leu Thr Ile Lys  
245 250 255

Arg Pro Glu Lys Phe Gly Gly Asp Leu Thr Val Asn Ser Tyr Glu Glu  
260 265 270

Leu Glu Ser Leu Phe Lys Asn Lys Glu Leu His Pro Met Asp Leu Lys  
275 280 285

Asn Ala Val Ala Glu Glu Leu Ile Lys Ile Leu Glu Pro Ile Arg Lys  
290 295 300

Arg Leu  
305

<210> 6  
<211> 306  
<212> PRT  
<213> Artificial

<220>  
<223> mutant synthetase derived from Methanococcus jannaschii tyrosyl-t



# RNA synthetase

<220>

<221> MISC\_FEATURE

<222> (107)..(107)

<223> X can be either C or S

<400> 6

Met Asp Glu Phe Glu Met Ile Lys Arg Asn Thr Ser Glu Ile Ile Ser  
1 5 10 15

Glu Glu Glu Leu Arg Glu Val Leu Lys Lys Asp Glu Lys Ser Ala Tyr  
20 25 30

Ile Gly Phe Glu Pro Ser Gly Lys Ile His Leu Gly His Tyr Leu Gln  
35 40 45

Ile Lys Lys Met Ile Asp Leu Gln Asn Ala Gly Phe Asp Ile Ile Ile  
50 55 60

Leu Leu Ala Asp Leu His Ala Tyr Leu Asn Gln Lys Gly Glu Leu Asp  
65 70 75 80

Glu Ile Arg Lys Ile Gly Asp Tyr Asn Lys Lys Val Phe Glu Ala Met  
85 90 95

Gly Leu Lys Ala Lys Tyr Val Tyr Gly Ser Xaa Phe Gln Leu Asp Lys  
100 105 110

Asp Tyr Thr Leu Asn Val Tyr Arg Leu Ala Leu Lys Thr Thr Leu Lys  
115 120 125

Arg Ala Arg Arg Ser Met Glu Leu Ile Ala Arg Glu Asp Glu Asn Pro  
130 135 140

Lys Val Ala Glu Val Ile Tyr Pro Ile Met Gln Val Asn His Asp His  
145 150 155 160

Tyr Met Gly Val Asp Val Ala Val Gly Gly Met Glu Gln Arg Lys Ile  
165 170 175

His Met Leu Ala Arg Glu Leu Leu Pro Lys Lys Val Val Cys Ile His  
180 185 190

Asn Pro Val Leu Thr Gly Leu Asp Gly Glu Gly Lys Met Ser Ser Ser  
195 200 205

Lys Gly Asn Phe Ile Ala Val Asp Asp Ser Pro Glu Glu Ile Arg Ala  
 210 215 220

Lys Ile Lys Lys Ala Tyr Cys Pro Ala Gly Val Val Glu Gly Asn Pro  
 225 230 235 240

Ile Met Glu Ile Ala Lys Tyr Phe Leu Glu Tyr Pro Leu Thr Ile Lys  
 245 250 255

Arg Pro Glu Lys Phe Gly Gly Asp Leu Thr Val Asn Ser Tyr Glu Glu  
 260 265 270

Leu Glu Ser Leu Phe Lys Asn Lys Glu Leu His Pro Met Asp Leu Lys  
 275 280 285

Asn Ala Val Ala Glu Glu Leu Ile Lys Ile Leu Glu Pro Ile Arg Lys  
 290 295 300

Arg Leu  
 305

<210> 7  
 <211> 77  
 <212> RNA  
 <213> Artificial

<220>  
 <223> mutant tyrosine amber suppressor tRNA

<400> 7  
 ccggcgguag uucagcaggg cagaacggcg gacucuaaa cgcgauggcg cugguucaaa 60  
 uccggcccgc cggacca 77

<210> 8  
 <211> 921  
 <212> DNA  
 <213> Artificial

<220>  
 <223> mutant synthetase derived from Methanococcus jannaschii tyrosyl-t  
 RNA synthetase

<400> 8  
 atggacgaat ttgaaatgat aaagagaaac acatctgaaa ttatcagcga ggaagagtta 60  
 agagagggttt taaaaaaaga tgaaaaatct gcttacatag gttttgaacc aagtggtaaa 120  
 atacatttag ggcattatct ccaaataaaa aagatgattg atttacaata tgctggattt 180

gatataatta tattgttggc tgattttacac gcctatTTaa accagaaagg agagttggat	240
gagattagaa aaataggaga ttataacaaa aaagtttttg aagcaatggg gttaaaggca	300
aaatatgttt atggaagtcc attccagctt gataaggatt atacactgaa tgtctataga	360
ttggctTTaa aaactacctt aaaaagagca agaaggagta tggaacttat agcaagagag	420
gatgaaaatc caaagggttc tgaagttatc tatccaataa tgcaggTTaa ttgctatcat	480
tataggggCG ttgatgttgc agttggaggg atggagcaga gaaaaataca catgttagca	540
agggagcttt taccaaaaaa ggttggttgt attcacaacc ctgtcttaac gggtttggat	600
ggagaaggaa agatgagttc ttcaaaaggg aattttatag ctgttgatga ctctccagaa	660
gagattaggg ctaagataaa gaaagcatac tgcccagctg gagttgttga aggaaatcca	720
ataatggaga tagctaaata cttccttgaa tatcctTTaa ccataaaaag gccagaaaaa	780
tttgggtggag atttgacagt taatagctat gaggagttag agagtttatt taaaaataag	840
gaattgcac caatggattt aaaaaatgct gtagctgaag aacttataaa gatttttagag	900
ccaattagaa agagattata a	921

<210> 9

<211> 921

<212> DNA

<213> Artificial

<220>

<223> mutant synthetase derived from Methanococcus jannaschii tyrosyl-t  
RNA synthetase

<400> 9

atggacgaat ttgaaatgat aaagagaaac acatctgaaa ttatcagcga ggaagagtta	60
agagagggttt taaaaaaaga tgaaaaatct gctggaatag gttttgaacc aagtggtaaa	120
atacatTTag ggcattatct ccaaataaaa aagatgattg atttacaaaa tgctggattt	180
gatataatta tattgttggc tgattttacac gcctatTTaa accagaaagg agagttggat	240
gagattagaa aaataggaga ttataacaaa aaagtttttg aagcaatggg gttaaaggca	300
aaatatgttt atggaagtgg attccagctt gataaggatt atacactgaa tgtctataga	360
ttggctTTaa aaactacctt aaaaagagca agaaggagta tggaacttat agcaagagag	420
gatgaaaatc caaagggttc tgaagttatc tatccaataa tgcaggTTaa ttgtatgcat	480
tatcacggCG ttgatgttgc agttggaggg atggagcaga gaaaaataca catgttagca	540
agggagcttt taccaaaaaa ggttggttgt attcacaacc ctgtcttaac gggtttggat	600
ggagaaggaa agatgagttc ttcaaaaggg aattttatag ctgttgatga ctctccagaa	660
gagattaggg ctaagataaa gaaagcatac tgcccagctg gagttgttga aggaaatcca	720

ataatggaga tagctaaata cttccttgaa tatectttaa ccataaaaag gccagaaaaa	780
tttgggtggag atttgacagt taatagctat gaggagttag agagtttatt taaaaataag	840
gaattgcatc caatggatttt aaaaaatgct gtagctgaag aacttataaa gatttttagag	900
ccaattagaa agagattata a	921

<210> 10  
 <211> 921  
 <212> DNA  
 <213> Artificial

<220>  
 <223> mutant synthetase derived from Methanococcus jannaschii tyrosyl-t  
 RNA synthetase; S1-5 with S at position 107

<400> 10	
atggacgaat ttgaaatgat aaagagaaac acatctgaaa ttatcagcga ggaagagtta	60
agagagggttt taaaaaaaga tgaaaaatct gcttacatag gttttgaacc aagtggtaaa	120
atacatttag ggcattatct ccaaataaaa aagatgattg atttacaaaa tgctggattt	180
gatataatta tattgttggc tgatttacac gcctatttaa accagaaaagg agagttggat	240
gagattagaa aaataggaga ttataacaaa aaagtttttg aagcaatggg gttaaaggca	300
aaatatgttt atggaagttc attccagctt gataaggatt atacactgaa tgtctataga	360
ttggctttta aaactacctt aaaaagagca agaaggagta tggaacttat agcaagagag	420
gatgaaaatc caaagggttc tgaagttatc tatccaataa tgcagggttaa tcatgatcat	480
tatatgggcg ttgatgttgc agttggaggg atggagcaga gaaaaataca catgttagca	540
aggagagcttt taccaaaaaa gggtgtttgt attcacaacc ctgtcttaac gggtttggat	600
ggagaaggaa agatgagttc ttcaaaaggg aattttatag ctgttgatga ctctccagaa	660
gagattaggg ctaagataaa gaaagcatac tgcccagctg gagttgttga aggaaatcca	720
ataatggaga tagctaaata cttccttgaa tatectttaa ccataaaaag gccagaaaaa	780
tttgggtggag atttgacagt taatagctat gaggagttag agagtttatt taaaaataag	840
gaattgcatc caatggatttt aaaaaatgct gtagctgaag aacttataaa gatttttagag	900
ccaattagaa agagattata a	921